

CLAIMS

What is claimed is:

1. An implantable microminiature infusion pump, comprising:
a reservoir configured to hold a therapeutic fluid;
a driver for delivering the therapeutic fluid from the reservoir to at least one exit portal, which exit portal is in contact with body tissue once the implantable infusion pump is implanted;
a control circuit that controls the operation of at least the driver; and
a data receiving circuit wherein control parameters are received from an external device once the implantable infusion pump is implanted, which parameters are used by the control circuit to control the operation of the driver.
2. The implantable microminiature infusion pump of Claim 1 further including a memory circuit coupled to the control circuit wherein control parameters are stored that control the operation of the driver.
3. The implantable microminiature infusion pump of Claim 1 wherein said reservoir includes a septum-type membrane through which a hypodermic needle may penetrate in order to replenish the therapeutic fluid held in the reservoir.
4. The implantable microminiature infusion pump of Claim 1 wherein said reservoir includes a plurality of isolated chambers, and further including a fluid mixer for mixing fluids contained in the isolated chambers in a desired proportion prior to delivering the mixed fluids to the at least one exit portal.
5. The implantable microminiature infusion pump of Claim 1 further including at least one regulator for regulating flow through the at least one exit portal.

6. The implantable microminiature infusion pump of Claim 1 further including at least one non-occlusion device for ensuring the therapeutic fluid can flow through the at least one exit portal.

7. The implantable microminiature infusion pump of Claim 1 further including a power source that provides operating electrical power to at least the driver and the control circuit.

8. The implantable microminiature infusion pump of Claim 1 further comprising pulse generator circuitry, including at least two electrodes electrically connected to the pulse generator circuitry, wherein said at least two electrodes are exposed to body tissue once the implantable infusion pump is implanted, and wherein said pulse generator circuitry generates electrical stimulation signals at said at least two electrodes in response to control signals generated by the control circuit.

9. The implantable microminiature infusion pump of Claim 8 further including a power source that provides operating electrical power to at least the pulse generator, the driver, and the control circuit.

10. The implantable microminiature infusion pump of Claim 8 further including a memory circuit coupled to the control circuit wherein control parameters are stored that control the operation of the pulse generator circuitry and the driver.

11. The implantable microminiature infusion pump of Claim 8 wherein said reservoir, driver, pulse generator, control circuit, and data receiving circuit are all housed within a thin cylindrical housing, and wherein one of said at least two electrodes is at one end of the housing, and another of said at least two electrodes is at the other end of the housing.

12. The implantable microminiature infusion pump of Claim 8 wherein said reservoir, driver, pulse generator, control circuit, and data receiving circuit are all housed

within a pancake-shaped housing, and wherein said at least two electrodes are spaced-apart on said housing.

13. The implantable microminiature infusion pump of Claim 12 wherein said at least one exit portal is located on the circumferential edge of said housing.

14. The implantable microminiature infusion pump of Claim 13 further including a multiplicity of exit portals spaced apart along the circumferential edge of said housing.

15. The implantable microminiature infusion pump of Claim 1 wherein the driver comprises a diaphragmatic type pump.

16. The implantable microminiature infusion pump of Claim 1 wherein the driver comprises a peristaltic type pump.

17. The implantable microminiature infusion pump of Claim 1 wherein the driver comprises a negative pressure pump.

18. The implantable microminiature infusion pump of Claim 1 wherein the driver comprises a positive pressure pump.

19. An implantable microminiature infusion pump comprising:
means for delivering at least one therapeutic substance to a patient; and
means for delivering therapeutic electrical stimulation to the patient.

20. The implantable microminiature infusion pump of Claim 19 further including at least one sensor for sensing a need for or therapeutic effect of the therapeutic substance and electrical stimulation.

21. A method of delivery of a therapeutic fluid and electrical stimulation using a microminiature infusion device capable of delivering both a therapeutic substance and electrical stimulation, comprising:

delivering both the therapeutic substance and the electrical simulation from the device for a first period of time, followed by
delivering only electrical stimulation from the device for a second period of time.

22. The method of Claim 21 wherein the second period of time comprises about two hours.